

Cedar River Chinook Redd Surveys and Carcass Collection: A review of abundance estimates, spawn timing, spawning habitat, and population age structure

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Background

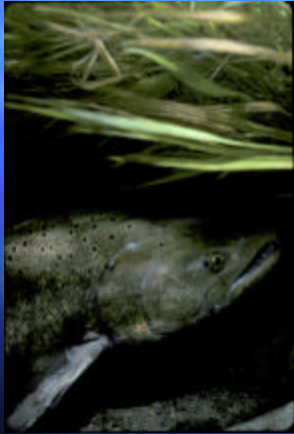
- Cedar River chinook redd surveys began in 1999 as a cooperative effort between Seattle Public Utilities, Washington Dept. of Fish and Wildlife and King County Dept. of Natural Resources
- Cedar River chinook carcass collection was initiated in 2001
- Redd Surveys and carcass collection have continued through 2002 and are currently funded through 2003.
- Inflatable rafts are used to visually locate chinook redds and carcasses in mainstem and sidechannel habitats between Landsburg Dam and Lake Washington



Survey Objectives

- Document spatial and temporal distributions for chinook spawning activity in the Cedar River
- Provide and alternative escapement estimate based on chinook redd counts
- Assist in the evaluation of operation protocols for chinook passage at sockeye broodstock collection facility located at river mile 6.5
- Documentation of microhabitat conditions at chinook redd locations (eg spawning velocity, substrate size, spawning depth, habitat type and distance to shore)
- Documentation of biological data such as number of fish per redd, redd residency time for guarding females, and population age/size/sex distributions from carcasses and scales
- Documentation of Interactions between spawning sockeye, spawning chinook and incubating chinook redds

Presentation Topics

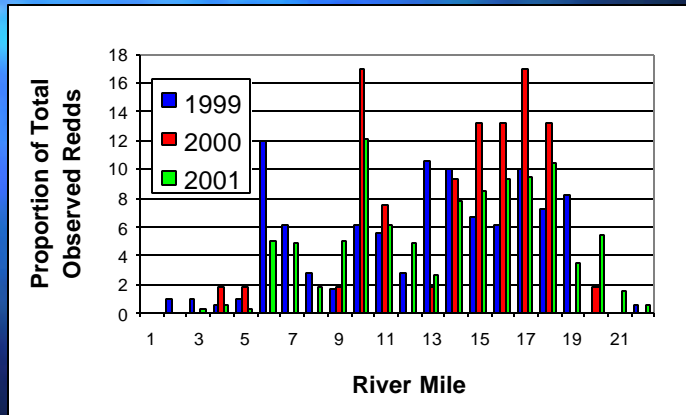


- Abundance Estimates based on Number of Redds (1999-2002)
- Spatial and Temporal Distributions for chinook redds (1999-2001)
- Microhabitat Data from 2000
- Sockeye/chinook and chinook/chinook redd superimposition 1999-2001
- Age composition and adipose clipped carcasses from 2001 and 2002

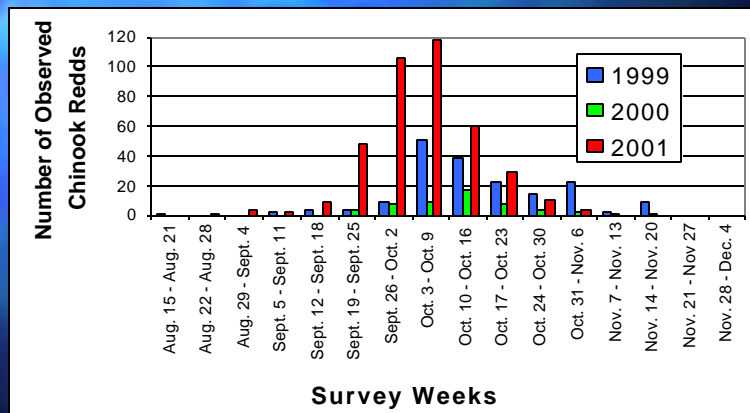
Alternative Escapement Estimate for Cedar River Chinook Based on Redd Abundance

Survey Year	Number of Redds	Redd Escapement Estimate (2.5 fish per redd)	AUC Escapement Estimate
1999	180	450	241
2000	53	133	150
2001	390	975	810
2002	266	665	369

Spatial Distribution of Observed Chinook Redds by River Mile (1999-2001)



Temporal Distribution for Observed Chinook Redds by Week of Spawning Period (1999-2001)



Habitat Types for 1999, 2000 and 2001 Redd Locations

Reach Habitat Type	1999 (180 redds)	2000 (53 redds)	2001 (390 redds)
Riffles	163 (91%)	38 (72%)	320 (82%)
Glides	16 (16%)	14 (26%)	63 (16%)
Pools and Tailouts	1 (2%)	1 (2%)	7 (2%)

Spawning Velocities ($0.6 \times \text{depth}$) at Observed Redd Locations in 2000 (n=51)

- Mean spawning velocity = **0.80 m/s** SD = 0.23
- Spawning velocities ranged from **0.32 m/s** to **1.42 m/s**

Values in Literature for Fall Spawning Chinook

Briggs (1953) velocities ranged from **.30 m/s** to 0.76 m/s

Collings (1972) velocities ranged from **.30 m/s** to .61 m/s

Thompson (1972) velocities ranged from **.30 m/s** to .91 m/s

Smith (1973) mean velocity = **.50 m/s**, range .20 m/s to .79 m/s

Bovee (1978) mean velocity = **.96 m/s**, range .37 m/s to **1.89 m/s**

Deverall et al. (1993) mean velocity = **.67 m/s**, range .40 m/s to .94 m/s

Groves (1999) velocities ranged from .40 m/s to **2.1 m/s**

Substrate Size (2000) and Redd Mound Depth (1999-2001)

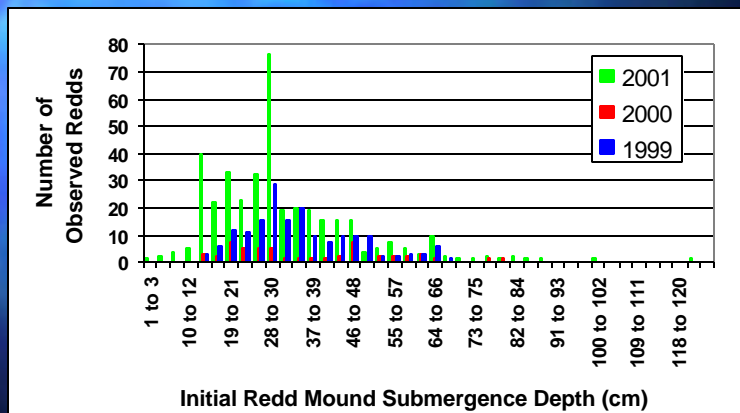
- Substrate size samples (n=51) using visual percent cover estimates (crude) showed a preference for large gravel (1.5" - 3.0" diameter) and small cobble (3.0" to 6.0" diameter)
- On average, 73% of the substrate observed around redds was in these two size classes
- Observed spawning substrate preference in Cedar River is consistent with values in Literature.

■ Redd mound depths at spawning:

Year	Mean	Range
1999	35 cm	13 to 69 cm
2000	36 cm	15 to 79 cm
2001	32 cm	3 to 119 cm

- 442 redds sampled and 2 vulnerable to dewatering at winter minimum flows of 260 cfs. The vulnerable redds were spawned at 400 cfs and 475 cfs respectively.

Redd Mound Depth Distribution (1999-2001)



Sockeye/Chinook and Chinook/Chinook Redd Superimposition Estimates (1999-2001)

Year	Sockeye Escapement Estimate	Number of Observed Chinook Redd Mounds	Sockeye/Chinook Redd Superimposition	Chinook/Chinook Redd Superimposition
1999	22,138	180	1%	12%
2000	148,225	53	12%	6%
2001	119,000	390	35%	8%

Age Distributions for 2001 and 2002 Cedar River Chinook Cohorts

Age from Scales	2001 (n = 240)	2002 (n = 275)
2	0.8%	1.8% (4 ad-clipped)
3	49.6% (2 ad-clipped)	10.2% (8 ad-clipped)
4	47.5% (1 ad-clipped)	84.7% (2 ad-clipped)
5	2.1%	3.3%

Acknowledgements:

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Field Work -

Seattle Public Utilities,
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National Marine Fisheries Service

Any Questions?